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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,821	12/07/2004	Morio Takahashi	8022-1080	7300
466 7590 02/26/2007 YOUNG & THOMPSON 745 SOUTH 23RD STREET 2ND FLOOR ARLINGTON, VA 22202			EXAMINER TRAN, HOANG Q	
			ART UNIT	PAPER NUMBER
			2874	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		02/26/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/516,821	<b>Applicant(s)</b> TAKAHASHI, MORIO	
	<b>Examiner</b> Hoang Tran	<b>Art Unit</b> 2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 November 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3-5,10-24,29-43 and 45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1,3-5,10-21,28,30-43 and 45 is/are rejected.
- 7) ☐ Claim(s) 22-24,29 and 45 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/04/06</u> | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 13, 15-21, 30-42 are rejected under 35 U.S.C. 102(b) as being unpatentable by the US Patent to Suzuki (6,031,957).

In terms of Claim 13, Suzuki teaches a substrate (Fig 1); a heater (Abstract); a clad layer (abstract); a clad layer provided directly or indirectly on said substrate (Fig 1 [4c]); a bridge section clad layer formed apart from said substrate and said clad layer in a portion corresponding to said heater, said bridge section clad layer being connected with said clad layer in a portion of said phase shifter other than said heater corresponding portion (Fig 1); a core layer provided inside said bridge section clad layer (Fig 1 [3]), wherein said bridge section clad layer and said core layer form a bridge section optical waveguide in said heater corresponding portion (Fig 1); said heater is provided inside or outside said bridge section optical waveguide apart from said core layer in said heater corresponding portion, and generates heater to change a phase of a light signal propagated in said bridge section optical waveguide (Fig 1); and a supporting section provided in a part of a space between said bridge section optical

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waveguide and said substrate in an extending direction of said core layer to support said bridge section clad layer (Fig 2 [8]).

As for Claim 15, Suzuki teaches the phase shifter of Claim 13, wherein said supporting section is formed of material with a thermal conductivity smaller than that of said substrate (Fig 2). Examiner would like to note support member (Fig 2 [8]) is made of silicon and substrate is made of quartz as stated in the reference (Col 3 [60-67]).

As for Claim 17, Suzuki teaches the phase shifter of Claim 13, wherein said supporting section is formed of a same material as said clad layer (Col 4 [30-40]). Examiner would like to note in the cited references prior art teaches that optical waveguide structure can be manufactured using quartz.

As for Claim 18 and 19, Suzuki teaches a supporting member (Fig 2 [8]). The examiner would like to note the Claims 18 and 19 are Product-by-Process claims. A product-by-process claim is one in which a product is defined at least in part in terms of the method or process by which it is made. In this case the limitations stated in Claims 18 and 19 refers to a method of forming a element of the product. The use of 102/103 rejections for product-by-process claims has been approved by the courts (See MPEP 2113). In re Marosi, 218 USPQ 289, 292 (Fed. Cir. 1983).

As for Claim 20, Suzuki teaches the phase shifter of Claim 13, wherein said optical waveguide clad layer has a width wider in ends of said heater corresponding portion than in a center of said heater corresponding portion (Fig 1).

As for Claim 21, Suzuki teaches the phase shifter of Claim 13, further comprising: a reinforcing beam provided in grooves between said clad layer and said

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optical waveguide clad layer on a way of said heater corresponding portion to support said optical waveguide be connecting said clad layer and said optical waveguide clad layer (Fig 1 [5]).

In terms of Claim 16, Suzuki teaches a substrate (Fig 1); a heater (Abstract); a clad layer (abstract); a clad layer provided directly or indirectly on said substrate (Fig 1 [4c]); a bridge section clad layer formed apart from said substrate and said clad layer in a portion corresponding to said heater, said bridge section clad layer being connected with said clad layer in a portion of said phase shifter other than said heater corresponding portion (Fig 1); a core layer provided inside said bridge section clad layer (Fig 1 [3]), wherein said bridge section clad layer and said core layer form a bridge section optical waveguide in said heater corresponding portion (Fig 1); said heater is provided inside or outside said bridge section optical waveguide apart from said core layer in said heater corresponding portion, and generates heater to change a phase of a light signal propagated in said bridge section optical waveguide (Fig 1); and a supporting section provided in a part of a space between said bridge section optical waveguide and said substrate in an extending direction of said core layer to support said bridge section clad layer (Fig 2 [8]) said supporting section is formed of material of an etching rate larger than that of said substrate.

As for Claim 33, Suzuki teaches the phase shifter of Claim 16, wherein said supporting section is formed of a same material as said clad layer (Col 4 [30-40]). Examiner would like to note in the cited references prior art teaches that optical waveguide structure can be manufactured using quartz.

As for Claim 34 and 35, Suzuki teaches a supporting member (Fig 2 [8]) and a core layer (Fig1). The examiner would like to note the Claims 34 and 35 are Product-by-Process claims. A product-by-process claim is one in which a product is defined at least in part in terms of the method or process by which it is made. In this case the limitations stated in Claims 34 and 35 refers to a method of forming an element of the product. The use of 102/103 rejections for product-by-process claims has been approved by the courts (See MPEP 2113). In re Marosi, 218 USPQ 289, 292 (Fed. Cir. 1983).

As for Claim 39, Suzuki teaches the phase shifter of Claim 16, wherein said optical waveguide clad layer has a width wider in ends of said heater corresponding portion than in a center of said heater corresponding portion (Fig 1).

As for Claim 40, Suzuki teaches the phase shifter of Claim 16, further comprising: a reinforcing beam provided in grooves between said clad layer and said optical waveguide clad layer on a way of said heater corresponding portion to support said optical waveguide be connecting said clad layer and said optical waveguide clad layer (Fig 1 [5]).

In terms of Claim 30, Suzuki teaches a substrate (Fig 1); a heater (Abstract); a clad layer (abstract); a clad layer provided directly or indirectly on said substrate (Fig 1 [4c]); a bridge section clad layer formed apart from said substrate and said clad layer in a portion corresponding to said heater, said bridge section clad layer being connected with said clad layer in a portion of said phase shifter other than said heater corresponding portion (Fig 1); a core layer provided inside said bridge section clad layer

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(Fig 1 [3]), and a supporting section provided in a portion of a space between said bridge section optical waveguide and said substrate in an extending direction of said core layer to support said bridge section clad layer (Fig 2);, wherein said bridge section clad layer and said core layer form a bridge section optical waveguide in said heater corresponding portion (Fig 1), and said heater is provided inside or outside said bridge section optical waveguide apart from said core layer in said heater corresponding portion, and generates heater to change a phase of a light signal propagated in said bridge section optical waveguide (Fig 1); and a supporting section provided in a part of a space between said bridge section optical waveguide and said substrate in an extending direction of said core layer to support said bridge section clad layer (Fig 2 [8]) said supporting section is formed of material of an etching rate larger than that of said substrate.

As for Claim 36, Suzuki teaches the phase shifter of Claim 30, wherein said supporting section is formed of a same material as said clad layer (Col 4 [30-40]). Examiner would like to note in the cited references prior art teaches that optical waveguide structure can be manufactured using quartz.

As for Claim 38 and 37, Suzuki teaches a supporting member (Fig 2 [8]) and a core layer (Fig1). The examiner would like to note the Claims 38 and 37 are Product-by-Process claims. A product-by-process claim is one in which a product is defined at least in part in terms of the method or process by which it is made. In this case the limitations stated in Claims 38 and 37 refers to a method of forming an element of the product. The use of 102/103 rejections for product-by-process claims has been

approved by the courts (See MPEP 2113). In re Marosi, 218 USPQ 289, 292 (Fed. Cir. 1983).

As for Claim 41, Suzuki teaches the phase shifter of Claim 30, wherein said optical waveguide clad layer has a width wider in ends of said heater corresponding portion than in a center of said heater corresponding portion (Fig 1).

As for Claim 42, Suzuki teaches the phase shifter of Claim 30, further comprising: a reinforcing beam provided in grooves between said clad layer and said optical waveguide clad layer on a way of said heater corresponding portion to support said optical waveguide by connecting said clad layer and said optical waveguide clad layer (Fig 1 [5]).

In terms of Claim 31, Suzuki teaches a substrate (Fig 1); a heater (Abstract); a clad layer (abstract); a clad layer provided directly or indirectly on said substrate (Fig 1 [4c]); a bridge section clad layer formed apart from said substrate and said clad layer in a portion corresponding to said heater, said bridge section clad layer being connected with said clad layer in a portion of said phase shifter other than said heater corresponding portion (Fig 1); a core layer provided inside said bridge section clad layer (Fig 1 [3]), and a supporting section provided in a portion of a space between said bridge section optical waveguide and said substrate in an extending direction of said core layer to support said bridge section clad layer (Fig 2);, wherein said bridge section clad layer and said core layer form a bridge section optical waveguide in said heater corresponding portion (Fig 1), and said heater is provided inside or outside said bridge section optical waveguide apart from said core layer in said heater corresponding



portion, and generates heater to change a phase of a light signal propagated in said bridge section optical waveguide (Fig 1); and a supporting section provided in a part of a space between said bridge section optical waveguide and said substrate in an extending direction of said core layer to support said bridge section clad layer (Fig 2 [8]) said supporting section is formed of material of an etching rate larger than that of said substrate said optical waveguide clad layer has a width wider in the ends of said heater corresponding portion than in a center of said heater corresponding portion (Fig 1).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 13, 15-21, 30-42 are rejected under 35 U.S.C. 103(a) as being unpatentable by the US Patent to Suzuki (6,031,957) in view of Ikeda (5,396,066).**

**Regarding Claim 1**, Suzuki teaches a substrate (Fig 1); a heater (Abstract); a clad layer (abstract); a bridge section clad layer formed apart from said substrate and said clad layer in a portion corresponding to said heater (Fig 1); a core layer provided inside said bridge section clad layer (Fig 1 [3]), wherein said bridge section clad layer and said core layer form a bridge section optical waveguide in said heater corresponding portion (Fig 1) and said heater is provided inside or outside said bridge

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section optical waveguide apart from said core layer in said heater correspond portion, and generates heat (Fig 1), said clad layer is formed on said substrate through a sacrifice layer (Fig 2 [8]), and said sacrifice layer is formed of the material with a thermal conductivity smaller than that of said substrate. Please note reference show (Fig 2 [8]) is made of silicon and substrate made of quartz. Suzuki does not teach a sacrifice layer and clad layer containing phosphor and boron. Ikeda does teach the use of boron and phosphorus to form electrodes through diffusion methods. (Col 4 [1-40]). **A motivation** to use such a material would be to form electrode like structures through diffusion process methods. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the process of diffusion using boron and phosphorus in order to created electrode/conductor like structure.

As for Claim 3, Suzuki teaches the phase shifter of Claim 1, wherein said core layer, said clad layer and said bridge section clad layer are formed of glass material contain quartz (Col 4 [30-40]). Also examiner would like to note waveguides comprising of substrate, clad, and core formed using material of ( $\text{SiO}_2$  =quartz) is extremely common in the art.

As for Claim 4, Suzuki teaches the phase shifter of Claim 1, wherein said glass material of said core layer contains germanium (Col [5-15]).

As for Claim 5, Suzuki teaches the phase shifter of Claim 1, wherein said substrate is formed of glass material containing quartz or silicon (Col 3 [20-30]).

As for Claim 10, Suzuki teaches the phase shifter of Claim 1, wherein said heater is provided on said bridge section clad layer (Fig 2).

As for Claim 11, Suzuki teaches the phase shifter of Claim 1, wherein said heater is provided in said bridge section clad layer apart from said core layer (Fig 1).

As for Claim 32, Suzuki teaches the phase shifter of Claim 1, further comprising: a reinforcing beam provided in grooves between said clad layer and said optical waveguide clad layer on a way of said heater corresponding portion to support said optical waveguide by connecting said clad layer and said optical waveguide clad layer (Fig 1 [5]).

**With respect to Claim 12**, Suzuki teaches the phase shifter of Claim 11, Suzuki does not teach wherein the heater is provided under said core layer in said bridge section clad layer. Since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70. **A motivation** to rearrange the heater into any location within the waveguide structure would enhance the heat distribution within the phase shifter. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to place the heater at a location where heat distribution would be maximize to reduce the cost of operation of the phase shifter.

**With respect to Claim 14**, Suzuki teaches the phase shifter of Claim 13 with a supporting member (Fig 2 [8]), Suzuki does not teach wherein a width of a portion of said bridge section optical waveguide where said supporting section is provided is wider than that of a portion of said bridge section optical waveguide where said supporting section is not provided. Since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the

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level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CCPA 1955). **A motivation** to reduce the size of the support member would be to decrease the cost of manufacturing. Therefore, it would have been obvious at the time of the invention to use decrease the size of the supporting member to cut the cost of material down during the manufacturing.

### ***Allowable Subject Matter***

Claims 22-24, 29, ~~44~~ and 45 are allowed. The following is a statement of reasons for the indication of allowable subject matter: The prior art is silent to the size of the sacrifice layer since after its removal therefore the claims indicated above are allowable.

### ***Response to Arguments***

Applicant's arguments, see remarks page 19, filed 11/15/2006 with respect to the rejection(s) of claim(s) 1, 3-5, 10-12 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Ikeda. In response to applicant argument regarding claim 31 wherein the applicant traverse that the prior art to Suzuki does not teach a bridge width being change in the center section. However in Figure 1 shows a center section wherein a gap exists at element [7]. Hence the width is no longer a solid-state structure therefore the width actual size is reduced compare to the width at the end. In regards to applicant argument regarding claims 13 has been considered however the cited support by the applicant (Col 3 [51-59]) does not state the

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structure will become inoperative without the sacrificial layer. The column only states the added feature was use to enhance cooling and heat dissipation.

**Conclusion**


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoang Tran whose telephone number is 571-272-5049. The examiner can normally be reached on 9:00AM - 5:00 PM.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ht



Hoang Tran  
AU 2874  
February 19, 2007



SUNG PAK  
PRIMARY EXAMINER